American School
of Classical Studies
at Athens

THE FOUNTAIN OF GLAUCE AT CORINTH

[PLATE III]

I. Κρήνη Καλουμένη Γλαύκης

Ἐς γὰρ ταύτην ἔρριψεν αὐτήν, ὡς λέγουσι, τῶν Μηδείας ἔσεσθαι φαρμάκων τὸ ὕδωρ νομίζουσα ἴαμα. — PAUS. II, 3. 6.

WHEN several years ago excavations were begun in and about the huge block of native rock 80 m. west of the temple of Apollo, the chief concern was the determination of another important point of Corinthian topography. As soon as it became evident that the fountain of Glauce mentioned by Pausanias had been discovered, excavation was discontinued. The details of the discovery were published with the recommendation that at some future time the work be resumed (*A.J.A.* IV, 1900, p. 461). The limits of the fountain house, the identification of which has been confirmed recently by the finding of the odeum just beyond (*ὑπὲρ τὴν κρήνην*), have now been determined; and though some questions can be answered only by further excavation, the results thus far obtained, prompt a reconsideration of the problem. Glauce is the best-preserved fountain of the times of the tyrants. At Megara the superstructure of the fountain of Theagenes is a matter of conjecture; the Enneacrunus has suffered such destruction that not even the ground plan is certain, and the restoration of its façade depends on a vase painting; the fountain house built by Eupalinus for the Samians is still undiscovered. Glauce, three of whose reservoirs are to this day covered by their original roof, is the most abundant source for information about the *krene* which proved so important a political asset of the tyrants of the seventh and sixth centuries.

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The fountain of Glauce was cut in the rock of the ridge on which the temple of Apollo stands (Fig. 1). In form it

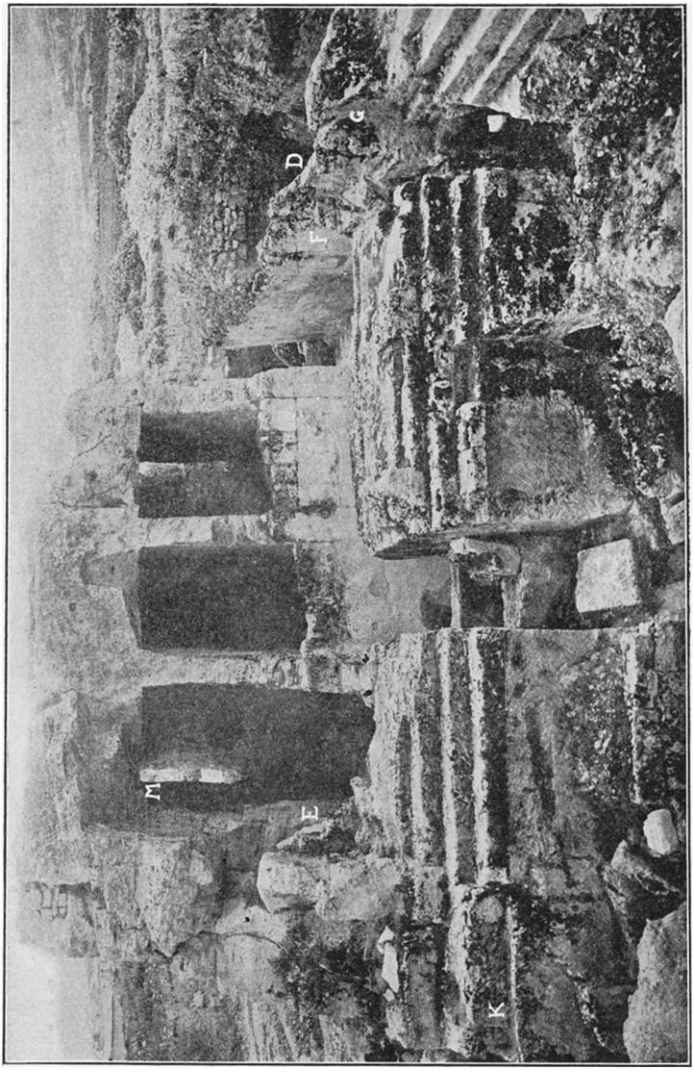

FIGURE 1.—THE FOUNTAIN OF GLAUCE—FRONT VIEW.

is roughly a great cube, 15 m. long and 14 m. wide, with a peculiar extension at the back. It consisted of four large reservoirs, I–IV (PLATE III), of a fifth which lies in front of II

and III, and of another (VI) at the northwest corner of the cube and at the western end of the platform which reached across the front and afforded access to the water. This platform is now badly worn, but seems originally to have been

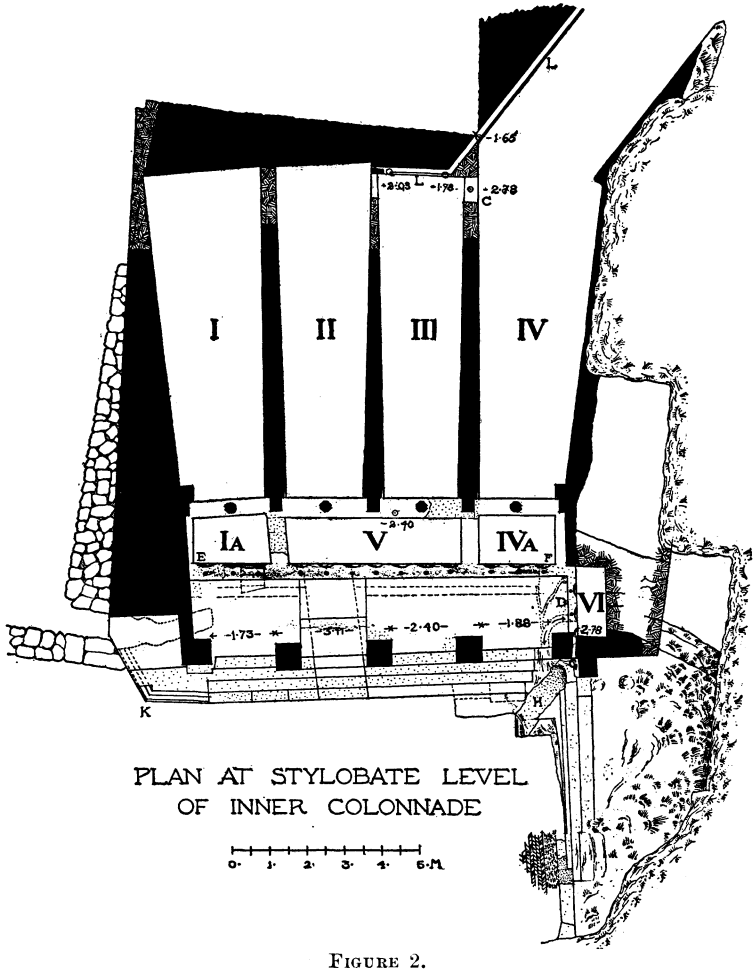

FIGURE 2.

about 2 m. higher than the floor of the reservoirs. As usual, the water was drawn in jars over a parapet, formed in this case of living rock but now broken away except in front of VI. The platform was approached by a flight of four steps

and was covered throughout its length by a vaulted roof of living rock. This rested along the outer edge on three square pillars between *antae*, and the five stumps of these supports still remain. The outer walls of the cube extended forward to the steps — the eastern wall with greatly reduced thickness (Fig. 2). The inner walls stopped at V, the back wall of which lay in the line of a second stylobate directly under the inner edge of the vault (Fig. 10). As the outer pillars stood in the line of the chamber walls, the inner were visible between them. These have disappeared, as well as most of the stylobate on which they stood. The inner walls terminated at this line in *antae*, which have been broken away except for a single stump.

The builders may have chosen a north front for the fountain because this involved the least exposure of the water to the sun and gave access to the cooling breezes from the Corinthian gulf, which, owing to the commanding position of Glauce, would blow in freely over the water. Whether the fountain house stood completely isolated is a matter of conjecture. It is certain that the Greeks quarried away the rock on the east side, for the even surface of that face is broken by a Greek water channel of careful workmanship (Fig. 3 *A*).

When Glauce was converted into a house in Mediaeval times, doors were cut in its walls. The east wall was originally quite closed. Original openings in the inner walls at the back were in some cases enlarged, so that it is now possible for one to look through the fountain from east to west (Fig. 3).

To facilitate the removal of the stone which was quarried within the chambers, a passageway 1.22 m. wide was cut through the platform to the depth of the chambers (PLATE III, Fig. 1). This passage is 4.33 m. long, but its continuation to the face of the rock was destroyed by later quarrying in front of the fountain. The fact that the inner walls of living rock do not reach forward to the platform, and that walls of squared blocks (PLATE III) are found here and at the north ends of II and III, is explained in the same way. When several hundred cubic metres of stone had been thus conveniently taken out, the five openings were closed with walls to the height of the

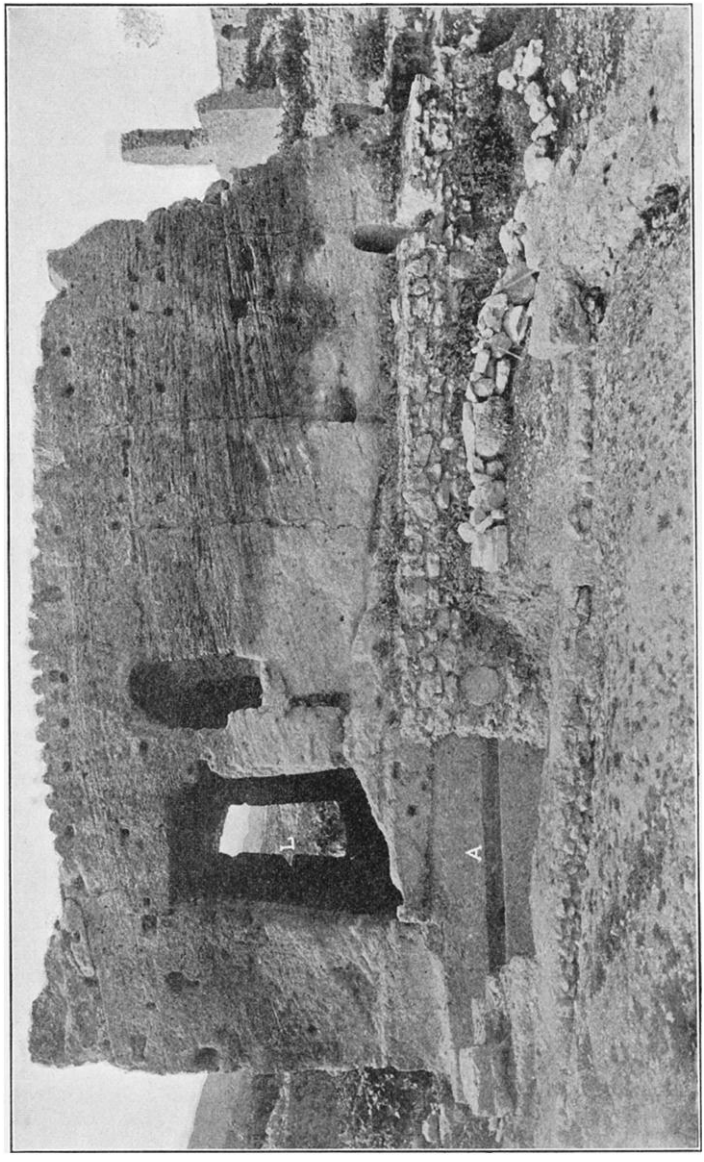

FIGURE 3. — THE FOUNTAIN OF GLAUCE — EAST FACE.

parapet, the passage through the platform covered with slabs, and the needed steps supplied. The passage was cut obliquely, but the cuttings for its cover were made straight with refer-

ence to the partition walls — a correction consciously sought (Fig. 1).

The fountain has been assigned to the time when the temple of Apollo was built, and the two have been regarded as parts of one building scheme. As no clamps were used in the fountain, we lack one important indication of date, but there is another detail which may throw some light on the matter. Concave

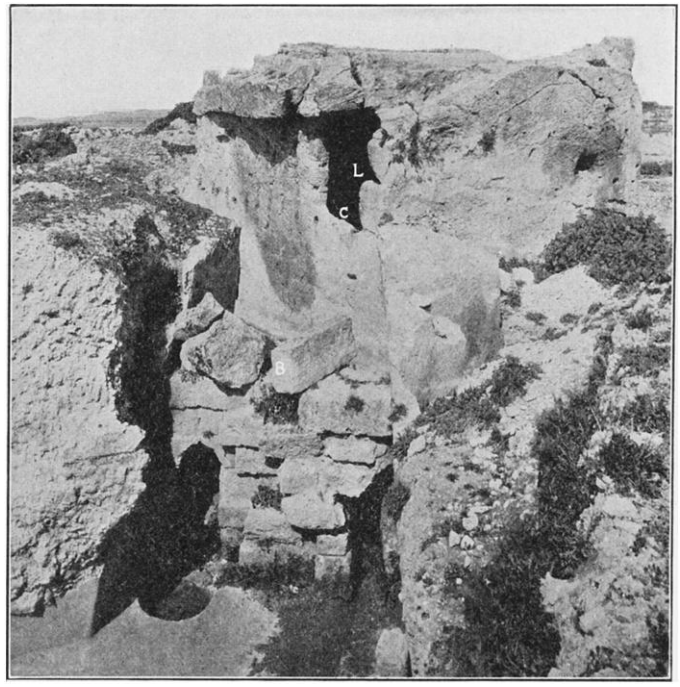

FIGURE 4. — GLAUCE FROM THE SOUTHWEST.

narrow cuttings, 0.10–0.12 m. long, hacked in horizontal bands with a rough little ridge between them (Fig. 4 *B*), are found on blocks of Glauce, of the temple of Apollo, and of the fountain frieze in the Agora, where the ⌝ clamp indicates the sixth century or about that date.[1]

[1] But this method of dressing poros blocks may have been in use a long while, and it is of interest to find it illustrated on blocks still *in situ* in the euthynteria of the Sicyonian Treasury at Olympia, especially since Dörpfeld has shown that stone for the treasury was imported ready cut from Sicyon (*Ath. Mitt.* 1883, p. 69). The early date given by Pausanias for this building has, however, been

We may turn now to a somewhat detailed account of the fountain of Glauce,[1] beginning with chamber IV, which received the water first. It differs from the others in length and form (PLATE III), extending back of the cube, at first southwest for 8.50 m. and then west 13.50 m., so that the total length is 33.05 m. The width varies from 2 m. to 3.50 m. The upper part is gone with the exception of a piece of the roof supported by the partition wall III–IV. This shows that the portion included within the cube had the same height as its neighbors I–III. The extension must also have been completely covered, probably with a roof of living rock. Its walls have a marked inclination (Figs. 4–5). Had these been vertical, the span of the roof would regularly have been 3.50 m., and 4 m. at the second bend. The east wall just back of the cube still stands to a height of 3.53 m. and has a forward inclination of 0.44 m. Another example of a reservoir cut with sloping walls in the solid rock is found on the Aspis at Argos. The better preserved of two long cisterns there has at the bottom a width of 3 m., which gradually diminishes to 0.80–0.25 m. at the present top. Voll-

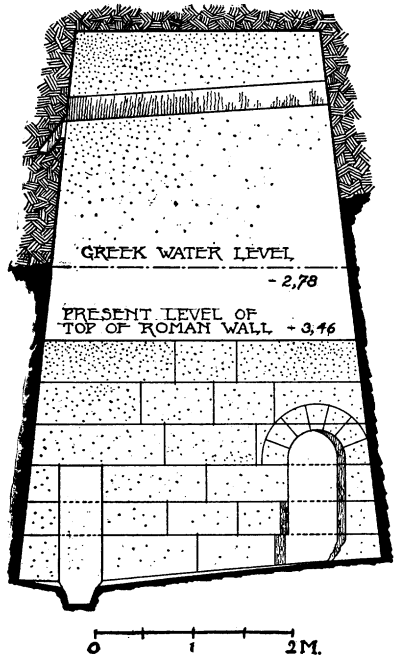

FIGURE 5. — CROSS-SECTION OF RESERVOIR IV AND ROMAN WALL.

rejected. Poros blocks at Delphi offer many examples of the same style of hewing, and it is a fact attested by inscriptions found there that this material was cut in Corinthian quarries (*B.C.H.* XXII, p. 304, l. 45). The style may be peculiar to the quarries of Sicyon and Corinth.

[1] I am indebted to Mr. B. H. Hill, Director of the American School, and to Mr. W. B. Dinsmoor, Fellow in Architecture, for helpful observations. The latter has kindly drawn the careful plans to which constant reference is made. Mr. H. D. Wood discovered the meagre but certain remains of the vault over the porch.

graff believes that the narrow opening was covered with slabs. (*B.C.H.* XXXI, p. 153.)

The water pouring first into IV, presumably at its extreme upper end (the upper half of the chamber has been quarried to the floor (Fig. 7) so that the inlet cannot be determined), filled this chamber, the small one (VI), and V, a chamber which served an important purpose in the system. The position of the narrow V in front of II and III made possible the drawing of water along three-fourths of the front, in case those chambers were empty. The original height of the walls of V is preserved only at the front of chamber III (Fig. 1), and the top block of the east wall has been identified. When chamber I had filled, water could be drawn all along the parapet. Connection between the chambers was effected by small openings at floor level; that of IV and V lay in the drain (PLATE III).

The fact that II and III were inaccessible from the platform makes it likely that they were the last to be filled. Water flowed from IV into III by means of an opening through their partition wall near the back wall of the cube (Fig. 4 *C*). This opening is 2.86 m. above the sloping floor of IV and is proved to be ancient Greek by the cement, a smooth hard composition containing little pebbles. This was applied to all interior surfaces in the fountain and presents by its excellence a striking contrast to the Roman stucco. Chamber II was filled by the overflow from III through an opening at the back wall. The thickness of the partition wall between these two chambers is noticeably less (0.05 m. at the back near the floor) than that of the other partition walls (0.32–0.40 m.). The water in II and III passed into V through the holes at floor level.

Not the least interesting is the small chamber VI at the west end of the platform. It is 0.44 m. shallower than the adjoining IV, whence its supply came through an opening 0.10 m. wide on that side and 0.25 × 0.25 m. on the other. Though the chamber was small, it increased the number of places by two or three at which water could be drawn — a clever expedient in the economy of the system. The heavy west and south walls have been quarried to within 0.75 m. of the floor, but the parapet remains 0.65 m. high and 0.25 m. thick (Fig.

1 *D*). On the inner face at the top, the surface has been worn concave in three places by the heavy jars of water drawn up over it, and on the top are two round tapering holes in which the women rested the pointed jars while they turned to take them upon their backs. Of a similar parapet in front of the other chambers the broken ends are still to be seen (Fig. 1 *E–F*). The stub at the east end (*E*) is 0.75 m. high and 0.40 m. thick. The inner surface shows the characteristic wearing from the jars. The parapets have been restored as equal in height with the walls of V.

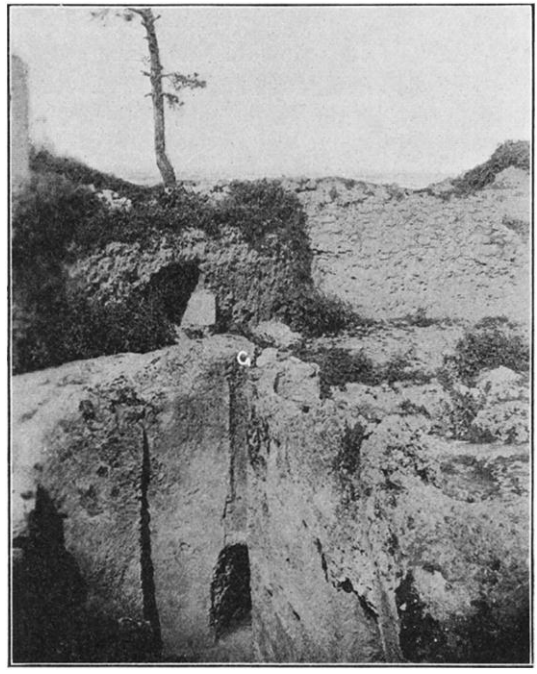

FIGURE 6. — EXCESS ESCAPE CHANNEL.

Provision was made for the escape of the excess water in the following manner. At the northeast corner of VI (Fig. 1 *G*), 2.54 m. above the floor of that chamber was an opening into a small channel 0.10 m. high and 0.13 m. wide (Fig. 6 *G*). The immediate connection with the chamber is broken away to the extent of 0.06 m., but it may readily be restored. From the corner it bent around to the north and in line with the parapet pierced the pilaster (Fig. 2 *G*), with at first a slight and then a marked drop. It emerges near the corner formed by this pilaster and another facing north. The rock has been broken off close to the channel so that its top is nowhere completely intact, but its character is unmistakable. Smoothly cut, it rivals in carefulness of workmanship the other

Greek channels of the fountain. Thus, when the capacity of all six chambers was overtaxed, the excess water escaped by this means, finding its way probably to a channel which crossed the front and east sides of the fountain and terminated perhaps in some cistern in the vicinity. For the part of the channel cut in the east face breaks off at the present southeast corner of the cube where later quarrying has disturbed Greek conditions, thus making it impossible to determine the destination of the water. And likewise in front of the porch later quarrying which cut into the steps destroyed the channel there, save for a short piece at the northeast corner. Here the normal depth of the channel, 0.17 m., is not maintained — the channel in front thus appearing to have been shallower than its continuation on the east face. This means of carrying away the excess went out of use when the tunnel under the east half of the platform was cut through. This tunnel, the inner end of which is ancient Greek, was made before the Roman stoa was built immediately on the east. The foundations for the west wall of the stoa were placed snug up to Glauce — so close that at the southeast corner of the cube the rock was cut back to make a bed for the foundation (Figs. 2 and 3) and the channel filled with rubble. The date of the stoa, which is not mentioned by Pausanias, is uncertain.

The method of the provision for excess water shows that no fountain of spouts existed in immediate connection with the system, and by giving the water-level it makes possible a calculation of the capacity of the fountain. When all the chambers were brimful, the total amount of water was 527 cubic metres, allowance being made by average for sloping floors, inclining and converging walls. This is an amount considerably greater than was provided for in the Megarian fountain, the capacity of which was 305 cubic metres. In the case of the latter, the excess escape has not been found, but the incrustation on the walls affords a satisfactory clew to the depth of the water. The floor area of the Corinthian fountain is 172 square metres, that of the less capacious Megarian 244. The maximum depth of water in the latter was 1.25 m. The conjectural character of the ground plan in the case of the Enneacrunus would render any calculation of its capacity extremely uncertain. The water was 1.50 m. deep.

The question of drainage may now be considered. A narrow gutter runs nearly the full length of IV and across V to the drain which lay in the wide passage cut through the platform (PLATE III, Fig. 1). In V the drain is 0.04 m. lower at the bend than at a point below the steps. This may be a device for collecting sediment and thereby preventing accumulation in the long course of the drain. The Romans must have regarded this feature as a defect, for they sought to give the drain an uninterrupted downward grade by a filling of brick and mortar. Toward this gutter all floors slope. The drain holes of II and III opened directly into it. Chamber I was drained and cleaned by an opening into V, which is 0.025 m. lower than either of the chamber's other connections. The purpose of the opening into the tunnel (PLATE III, Fig. 10) seems to have been to empty I without necessitating the disuse of V. The important fact, which seems not to have been noticed in discussions of fountain construction, is that all the chambers were not drained and cleaned at once. While I, II, III, and V were undergoing the process, IV and VI furnished water, and *vice versa*, when IV, V, and VI were empty, I, II, and III contained the supply.

In the latter case the stream of water which poured regularly into IV at the upper end had to be diverted. It flowed in a high channel along the south and east walls of IV to the cube (*L* in Figs. 2, 4, 5). The elbow of the channel found embedded in the Roman cross wall fits the angle made by those two walls. At the cube the channel still preserved (Fig. 4 *L*) passes 4.15 m. above the floor to III, where it bends and crosses the back wall of that chamber with a marked grade of 1 in 8. It ends in the line of the partition wall III–II, in a small hole opening into II. Some question may arise as to the date of this hole, for it is not well cut. But that the original design was to have the channel end in II, so that water might be carried past III, is a safe inference, first from the fact that otherwise the channel had no need to cross III and secondly because chamber II reaches 0.30 m. back of III (PLATE III), as if to give the water a free fall into II. Then again a plug hole like the existing one could be more easily controlled from the large opening in the roof, which is thought to be Greek.

This opening was probably somewhat enlarged and provided with rudely cut steps to serve as a means of ascent to the roof when Glauce became a house. There was also a large opening in the partition wall of II–III at its south end, near the end of this channel. This is shown by the presence of ancient Greek cement on the back wall where the partition wall would have joined it, but how large an opening there was cannot now be determined, for it became a door in the house period and has since been made larger (Fig. 3). The dimensions and character of the channel are those of the one on the east face of the cube (both appear in Fig. 3). Though it has been exposed to the wearing influences of the atmosphere and has lost every trace of cement, the careful cutting is still in evidence. The water carried by this channel flowing along IV poured into III and II, sometimes only into II, and thence passed to I, where it could be drawn from the platform. It is possible that III was sometimes filled and not II, and then the water passed from III into V, since any attempt at working out the problem of the distribution of the water must allow for the fair probability that the four large reservoirs were filled successively rather than simultaneously. The water in II, when V was empty on cleaning days, passed into I though a cement-lined hole at the floor level of that chamber (PLATE III).

The position of this hole near the front wall of II prevented a constant forward movement of the water in I from the back of the chamber to the front. In the case of II, III, IV the water poured in at the upper end of the chamber and moved forward to the place of drawing, for it is probable that when all six reservoirs were full, the plugs in the openings from II and III into V were removed. A peculiar feature of II, namely, that its floor is 0.22–0.25 m. lower than that of I and III, allowed the sediment to settle on this lower level and to remain undisturbed when the water flowed into I. Such accumulation could be removed and the chamber flushed by means of the hole opening into the drain in V. The carefully cut and cement-lined opening from II into I is 0.095 m. in diameter at the end in II and 0.08 m. at the other. This tapering, which is true also of the opening from III into V, follows the normal direction of the flow between those chambers. The excess

from I–II–III apparently flowed from the latter into IV by means of the opening (Fig. 4 *C*) at the back of the partition wall between III and IV. In fact, IV may thus have been refilled.

The high channel in IV which on cleaning days made it possible for the system to supply water is of importance in

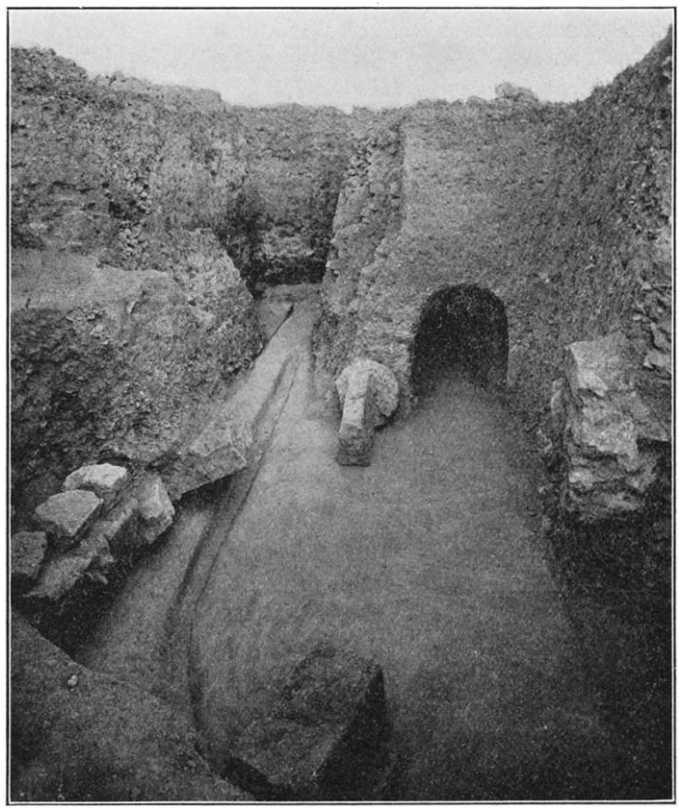

FIGURE 7. — UPPER END OF IV, SHOWING HOW THE WALLS HAVE BEEN QUARRIED AWAY.

another respect. The almost complete destruction of the walls of IV back of the cube (Figs. 4, 7) has left in uncertainty the height of the roof of that part. In one place the sloping walls have a height of 3.53 m., but in the western half they have been quarried to the very floor (Fig. 7). Now the bottom of the channel in question is 4.15 m. above the floor at the back of

the cube and it sloped up somewhat to the point of inlet, keeping within IV. The roof had to be still higher. As the height of the roof preserved is 5.57 m., it becomes probable that this height was continued back over the extension of IV.

It remains to consider what the means of draining VI were. There is a rock-cut tunnel (PLATE III, Fig. 1), starting from the east side of the chamber; this curves around under the platform and seems, before the Roman quarrying, to have joined the drain of the system. The chisel marks show that the tunnel was cut from the chamber toward the stair. At the inner end it is 1.05 m. high and 0.50 m. wide. The south wall has not a gradual curve, but breaks forward 0.04 m. several times. The bottom is approximately 0.60 m. below the floor of the chamber, which, except around the edges, has been cut into and badly damaged. The tunnel, which is Greek, was sealed at the inner end by a wall with a drain hole at the bottom of it. Towards the tunnel entrance the floor of the basin slopes from every side. The removal of the wall must be referred to the time when the tunnel was used in connection with two later channels. A glance at the plan will show that the tunnel was made for neither of these, but had a conduit of its own before the rock pavement in front of Glauce was quarried by the Romans. The tunnel in Greek times may have been used in drawing off a portion of the contents of IV.

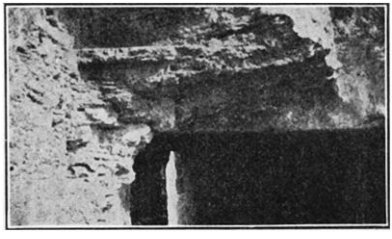

FIGURE 8. — THE ARCHITRAVE.

Up to this point the details of construction which played an immediate part in the operation of the system have been considered. A question now arises as to the ornamental features of the fountain, if any there were. Its character would admit only of the simplest ornamentation, and of such a fragment has been preserved. In the upper northeast part of the cube, scantily protected by the heavy roof and east wall, is the weather-beaten bit of a rock-cut architrave (Figs. 1 *M*, 8, 9, 10). The plane of the bottom coincides with the ceiling of I. The vertical face reaches up 0.29 m. and is crowned by a simple

cornice. Above, the rock is cut back 0.12 m., and from there upward and forward the roof curves distinctly, but it breaks

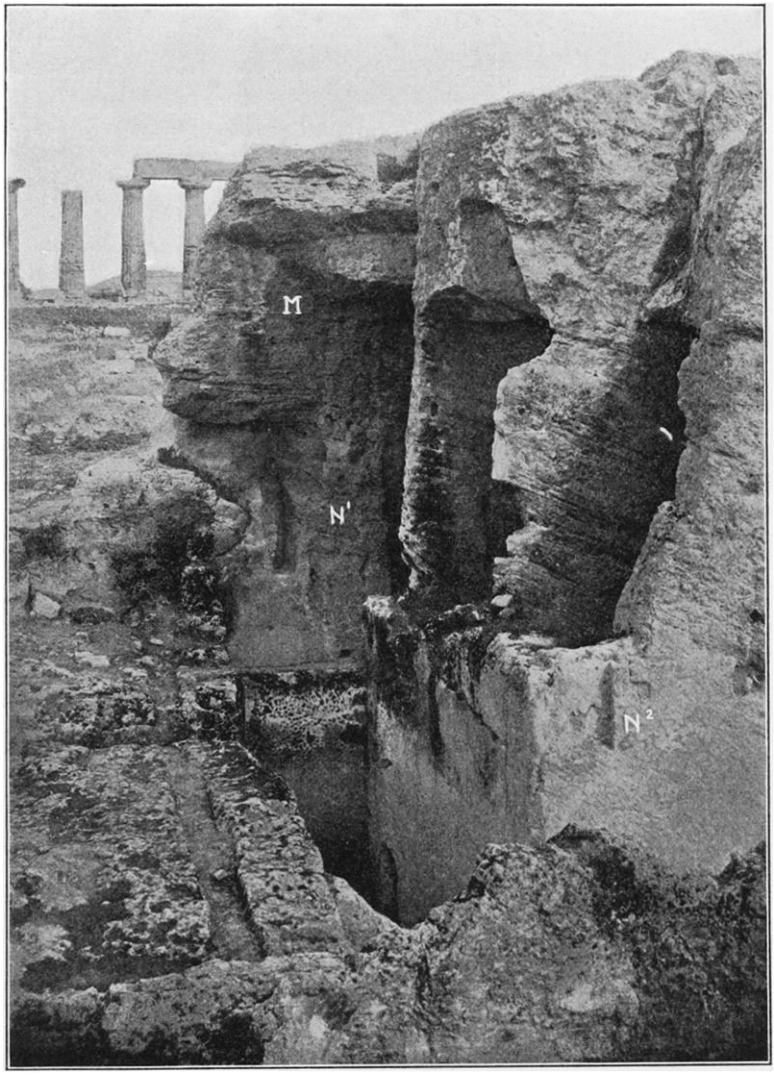

FIGURE 9. — VIEW FROM WEST ACROSS RESERVOIRS.

off 1.50 m. from the architrave, and the further course of the curve is a matter of probability. It seems such that its highest point stood approximately over the middle of the

space between the architrave and the rock-hewn pillars on the outer edge of the platform. In the angle formed by the east wall and the vault there is a bit of that excellent cement used in the chambers, to testify that the vault is Greek. As the roof is preserved in front of the architrave only at the northeast corner (Fig. 1) (the break retreats more and more as it is followed toward the west), the evidence for a vaulted ceiling is

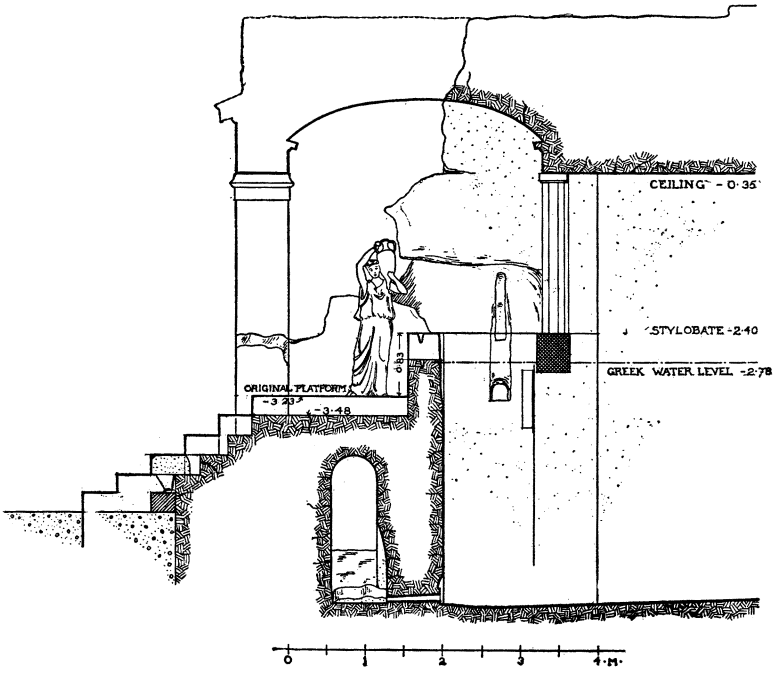

FIGURE 10.—CROSS-SECTION THROUGH PORTICO.

confined to that place, but it may safely be assumed to have extended across the whole porch and may be thought of as an expedient for reducing the weight of the rock, since the span from architrave to pillars was 3.30 m. (Fig. 10). The fact that a vault existed over the platform makes it possible to determine the height of the rock-hewn pillars, the broken stumps of which remain. If one makes the fair assumption that the vault terminated above the pillars in an architrave corresponding to that of which a piece is preserved, a height of 2.88 m. is obtained for the pillars including capitals.

Again, the fragment of the architrave makes intelligible certain cuttings that prove most important in the restoration of the interior of the porch. Beneath it the Greeks cut in the walls of I two holes, 0.10 m. deep, 0.45 m. wide, and 0.55 m. high, opposite each other, and 3 m. above the floor (Figs. 9 N^1, 10). The same thing may be observed in IV also (Fig. 9 N^2). The portion of the west wall of I in which the cutting was made has been broken away, but both cuttings can be seen in IV, the east one of which contains abundant

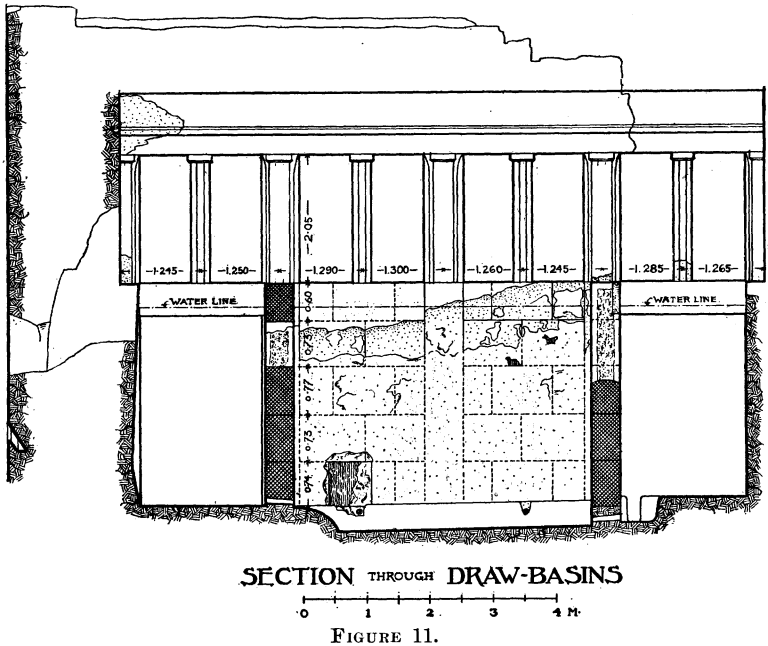

FIGURE 11.

remains of Greek cement. A bit of the right angle which the cement forms shows that the beam was lowered into these cuttings before the Greeks cemented the chamber. As these beams were not set deep in the walls (less than 0.10 m.) and had no other support, it is obvious that whatever rested upon them fulfilled no necessary structural function. The idea therefore suggests itself that they, together with the back wall of V lying in the same line (Fig. 2), had at their middle points shafts which reached up to the architrave (Fig. 11). A fragment of

an octagonal shaft of poros has been found in the neighborhood of Glauce, with the required diameter of 0.28 m., and has been assigned to this stylobate. One thinks immediately of the octagonal shafts in the fountain of Theagenes (Fig. 15).[1] At the end of the partition wall between III and IV the stub of an anta is preserved, and with the help of this others have been restored at the ends of the other partition walls (Figs. 2, 12). For these antae the walls were narrowed to the proper width.

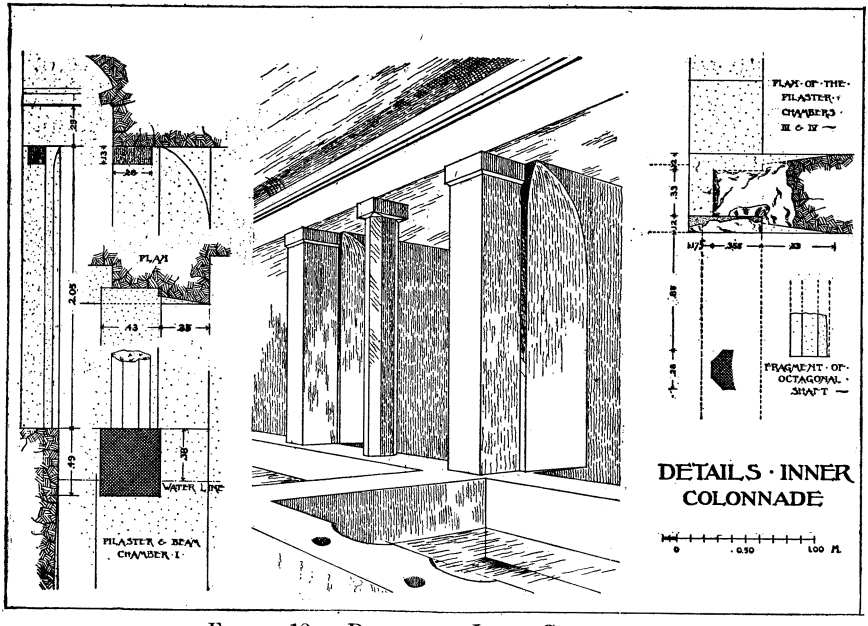

FIGURE 12. — DETAILS OF INNER COLONNADE.

This is best seen in the case of the partition wall between I and II, where the narrowing reaches down only to the level of the stylobate. Yet another important feature is explained by the presence of the shafts. In I and IV the outside walls advance at a point just back of the stylobate (PLATE III). The simple reason is that the four long chambers thus acquire at the stylobate an approximate width of 2 m., and a uniform intercolumniation results.[2]

[1] See also Furtwängler, *Aegina*, p. 84.

[2] The two marble lion-heads found in chamber V presumably belonged among the decorative features of the fountain at some period, but they cannot be definitely placed. See *A.J.A.* VI, 1902, p. 423.

The interior surfaces of the porch were covered with cement, as were those of the chambers. The pilasters of the outer row of pillars show traces of it on the front face, a survival suggesting that the façade was also so covered. The walls and ceiling of the Athenian Callirhoe received in Pisistratean times a coat of stucco. Ross (*Reisen*, I, 130) describes a rock-hewn system in Ceos, and here the reservoir and early Doric column of living rock were similarly treated. But apart from any example of such practice, the soft and porous character of the rock in Glauce, which suffered from exposure to the elements, would require a protecting coat of stucco.

Before the Glauce of Roman times is considered, a moment may be spent in conjecturing what the condition of the fountain was when the Romans had destroyed the city. There is some ground for the suspicion that before the coming of the Roman rebuilders of Corinth, Glauce was already partly ruined. The cross wall in IV, which is referred to the early years of Roman reoccupation, contains several pieces from the cemented walls. It would thus appear that, at the time the cross wall was built, reservoir IV had in part been destroyed. It is significant that among the pieces is one from the channel which carried water to III, when IV was for any reason empty, a fact which shows that a channel of prime importance in the Greek system of distributing the water had been destroyed before the Romans repaired IV. In fact, the position of the cross wall seems to have been determined by the ruined state of the Greek walls behind it (Figs. 4, 7).

Coming to the part of IV lying in front of the Roman cross wall, one meets again with a hint that the roof and the upper part of the west wall may have gone before Roman times. A comparison of the east and west walls of Glauce shows a noticeable difference in width (PLATE III, Fig. 2). The east wall, which has been preserved unchanged from Greek times, is 2 m. thick in the line of the inner stylobate; on the other hand the present west wall at the same line is only 0.60 m. and a little farther back it is only 0.45 m. While the east wall could and did without danger grow thinner as it neared the thick back wall, the west one must have maintained a nearly uniform width, because the back wall did not cross IV to assist in bear-

ing the weight of the roof. It is certain that the Greeks did not support the roof along the west side with the present thin wall, a fact which is confirmed by a glance at the west face of it, which is rough, whereas the outer face of the east wall is smooth. Was the quarrying into the west wall done by the Romans, when the wall no longer supported the roof of IV, or did the Romans by quarrying too closely cause immediately or ultimately the fall of the roof? It is tempting to make the collapse of this section contemporary with that of the portion back of the cross wall. Evidence that the façade was destroyed at this time is not at hand, and if it was destroyed then, we should have to suppose that the stumps of the pillars remained standing throughout the Roman period, an unsightly obstacle on the platform.

The façade was partly in ruin when the inner walls of VI were quarried to within 0.75 m. of the floor, since this left the vaulted roof with too little support at the northwest corner. But the time when those walls were quarried away is uncertain. A set of foot holes carelessly cut in the east wall to facilitate descent may mean that the basin was in use in Roman times. This would have been possible, however, when the roof above was gone.

While it is conceivable that Glauce was found intact, and repaired only after a period of use by the Romans, it is also conceivable that the Roman destroyers of Corinth in 146 B.C. wrecked a structure so essential to the life of the city. The long fourth chamber as the most vital, because it first received the water supply, and the façade as the most pleasing feature of the structure might well have borne the brunt of the attack. The Roman senate had ordered that the city should not be rebuilt.

The façade of the fountain was broken away (Figs. 1, 9) and not a fragment of it has been identified. The line of breakage is from 2.50 to 4.50 m. back of the pillars, so that the difficulty of restoration is greatly increased. The broken stumps along the outer edge of the platform show that three squared pillars between pilasters stood there. They were 2.88 m. high and must have had the simplest of capitals if they had any at all. How the rock above was treated is uncertain; perhaps a plain

architrave, with Doric frieze and pediment, was used. The fact that the heavy east wall stopped 1.35 m. back of the line of pillars, save for a strip 0.25 m. thick which reached to the pilaster (Fig. 2), perhaps indicates an expedient for setting off the façade. The Doric frieze for early fountains is attested by the François vase, but it is uncertain what form of roof is there intended. The gable has the sanction of sixth-century vase painting and is not without a real, though later, example in Corinth itself. Pirene on Acrocorinth has a pillar between pilasters and above a tiny pediment.[1] At Cyrene the face of the cliff above the fountain of Apollo shows a gable cutting into which Smith and Porcher (*Discoveries in Cyrene*, p. 26, pl. XI) believe the pediment of a portico to have been fitted.

The exact source of the water supply for Glauce is unknown. The native rock a few paces back of the fountain has been examined for a distance of 73 m. by digging a trench to the level of the inlet into the fourth chamber. But the expected conduit cut in the rock in the direction of the acropolis has not been found. The supply was not surface water gathered in the vicinity, but was brought from a distance. The unique position of Glauce, which is best appreciated when it is compared with the Corinthian fountain of Pirene, warrants this conclusion. The latter lay low in a hollow under a projecting ledge of conglomerate, and it had an abundant watershed to which the acropolis contributed. The Greeks simply recognized a natural reservoir and by opening up conduits in the clayey soil under the conglomerate developed latent possibilities of water supply. Water in front of Pirene still covers the hard pan. With Glauce, however, it was quite different. Instead of being situated under a ledge it was cut in the top of one where no spring existed and it did not have a watershed like Pirene.[2] Only from the south and southwest could water have come, and what did come was below the floor. The well dug at a late

[1] See Göttling, 'Die Quelle Pirene auf Akrokorinth und das Kraneion unterhalb Korinth,' *Arch. Ztg.* II, 1844, pp. 326–330.

[2] The conduit which brought water to Glauce must have had an uninterrupted gradual slope toward its destination. This was a characteristic of early Greek conduits. The principle of forcing water up by means of water-tight pipe lines seems to have appeared first in Hellenistic times. Cf. Weber, *Jb. Arch. I.* XX (1905), p. 209.

date just behind the Roman wall (Fig. 4) has a depth of 4.35 m., and at this depth three tunnels reach out to gather the water. The depth of water-level beneath Glauce is explained by the fact that the rock falls away toward the acropolis. The strata of the rock incline the same way. The site of Glauce was chosen without regard to a watershed. The supply came from some spring, perhaps, as has been suggested (*A.J.A.* IV, 1900, p. 461), from that at the base of Acrocorinth, where to-day the water is abundant and good. A confirmation of this opinion is afforded by the evident contrast in quality between the water that flowed to Pirene and that which supplied Glauce. The water of Pirene has left a deposit on the walls of the chambers, but the walls and floors of Glauce show only the very slightest trace of any incrustation. Pirene depended upon the percolation of subsurface water, and by this process were gathered those ingredients which so completely and so obstinately concealed and preserved the Roman painting which has been found on the walls of its reservoirs.

According to the ancients (Strabo, VIII, 379; Pausanias, II, 5, 1), water flowed from the spring near the summit of the Acrocorinth to the spring at the base of the hill, which, as has been said, may have been one of the sources of Glauce. Their characterization of this water and that of Pirene is interesting. The spring on the summit, says Strabo, was full of transparent and potable water; on the other hand, Pausanias says that the water of Pirene, though pleasant to the taste, was used in the tempering of bronze, and he attributes the distinctive color of Corinthian bronze to the nature of the water. In the days when conjecture identified the Bath of Aphrodite with Pirene, Göttling suggested that the ochre-like deposit may have given a color to bronze (Frazer's note on Pausanias, II, 3, 2). Periander, therefore, if he was the builder of Glauce, rendered the Corinthian public a service by bringing to the heart of the city water which offered no attraction to coppersmiths.[1]

[1] "Although Strabo and Pausanias agree in regard to the reported communication between the well of the Acrocorinthus and the fountain Pirene of the lower city, they differ as to the position of that lower fountain. Pausanias describes it as on the road from the Agora to Lechaeum, Strabo as issuing from the foot of the Acrocorinthus; and thus it appears that there were three sources at Corinth all of which at some period of time at least, were known by the name of Pirene.

The problem presented by the roof of Glauce is a troublesome one. There are two beds for walls, the interpretation of which is made difficult by the fact that large portions of the roof are gone. One of these wall beds, 0.55 m. wide, is carefully cut along the back edge of the cube, but so much has been broken away that one cannot say how far it extended. (Fig. 4). This bed ends toward the east at a roughly cut block of living rock which rises 0.90 m. above it, and happily gives a clew to the height of the wall. The vertical surface of the block for a distance of 0.60 m. from the top has been smoothed in contrast to the portion below and behind the line of the wall. The wall was thus 0.60 m. high. A gutter, perhaps Roman and similar to the long one on the platform, ran along inside toward the west. The second wall bed, 0.50 m. wide, and 7.25 m. in front, runs parallel to the first and was made by cutting away the rock on either side to a depth of 0.13 m. (Fig. 13). In front of this raised bed, as far as the broken edge and behind for a distance of 1.25 to 3 m., the roof is even enough, but farther back there are deep quarry cuttings. A large block of living rock 1.80 × 1.25 × 0.50 m., still remains. How far west the forward bed extended is uncertain. It breaks off over the partition wall between II and III, beyond which the roof, apparently at a later date, has been more deeply quarried. The base of the raised bed is 0.60 m. higher than the other. That a wall stood on the raised bed at some time is clear from the presence of cuttings for a door 0.50 m. from the east end. When Glauce became a house and a third story was added, these wall beds must have been in use. Whether the raised

All the three are still observable; namely, the well in the Acrocorinthus, the rivulets which issue at the foot of that hill, as described by Strabo," etc. (Leake, *Morea*, III, p. 242.) Tozer (1893), *Selections from Strabo*, p. 218, note 1, does not share Leake's opinion, but regards Pausanias's definition of the location of the lower spring as more exact than Strabo's. According to Tozer, both meant the same spring; but the words of Strabo: *τὴν πρὸς τῇ ῥίζῃ τοῦ ὄρους κρήνην ἐκρέουσαν εἰς τὴν πόλιν* apply to the spring which Leake selected rather than to the Pirene near the Lechaeum road. For the former lies at the foot of Acrocorinthus, from which it could flow out to the city, while the latter is not situated at the base of the mountain (though it lies in a city which is *πρὸς αὐτῇ τῇ ῥίζῃ τοῦ Ἀκροκορίνθου*), but so low in the heart of the city as to be unable to flow out to it. The conduits leading from the hypaethral Pirene appear to have been drains rather than carriers of excess to be used elsewhere.

bed belongs in that period is a question, but the character of the other is too good to warrant this supposition. It is suggested that this wall belonged originally to the finished form of the roof. From the high ground 50 paces back of Glauce (Fig. 13), where hard-pan lies near the surface, the roughly quarried sloping roof is plainly visible. It may not have been so scarred in early Greek times, but if a wall 0.60 m. high were restored on the back bed, the roof as far as the raised bed would disappear from view. Evidence for this wall has been

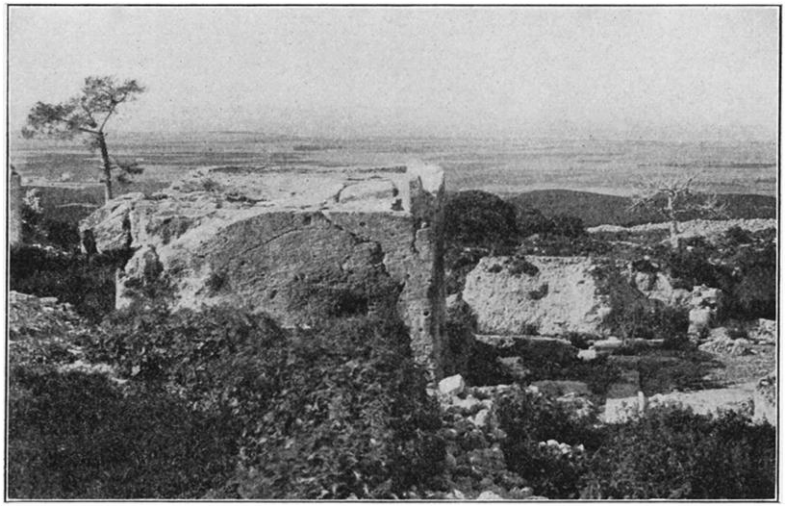

FIGURE 13. — VIEW OF ROOF FROM THE SOUTH.

noted above, and is strengthened by the fact that a piece of the wall itself has been identified — the poros block 1.50 m. long, 0.40 m. wide, and 0.60 m. high, which lies on the cross wall in IV (Fig. 4 *B*). The dimensions meet the requirements, and the bottom was prepared for a bed. The finish of the top shows that another course was not laid upon it. The outer face hacked in horizontal bands is characteristic of blocks in Glauce, and the inner face is very rough.

GLAUCE IN THE ROMAN PERIOD

It is probable that soon after the Roman reoccupation of Corinth the fountain was repaired. The chief feature in the

Roman repair was the cross wall in IV, which was placed at a point where the chamber walls survived to the necessary height. The bed for it was cut deeper at the west end to get rid of the slope of the floor. The part of IV behind the wall was filled in at once, for that side of the wall was not intended to be seen (Fig. 4). Two coats of stucco at different times were applied to the wall, and later a third was added which was extended to all surfaces, except the floors, that came in contact with the water. The hard Greek cement was picked (Fig. 1) that the inferior Roman might be more adhesive.

The parapets were lowered, the long one 0.35 m., the short one, in front of VI, 0.48 m. The Greek excess escape was thus made useless. The Roman level in front of Glauce, after the quarrying there, was that of Greek times, if the channel (Fig. 1 *K*) at the northeast corner determines the latter. The filling is uniform, without trodden layers, up to the level of the first Roman step. The present steps are probably not Greek. Those extending north from the sixth reservoir vary in height from 0.27 m. to 0.33 m., the others from 0.24 m. to 0.25 m. The only indication that a flight of steps existed here in Greek times is the presence of a pilaster facing north (Fig. 2). This may imply another colonnade, but no traces of pillars have been found. The present flight seems not to have been cut with reference to the pilaster.

The source of water supply in Roman times calls for brief mention. As yet no traces of the Roman conduit that brought the water have been found, but it was only natural that those who repaired the fountain should make use of the Greek source. There is an argument of some weight in favor of the view that there was no change in the source of supply. Pausanias mentions no spring on the ascent to Acrocorinth. The argument from silence in the majority of cases is indeed of doubtful value, but in this instance it is significant, and the following remarks of E. Curtius (*Ges. Abh.* I, p. 117) are worth quoting: "Begleiten wir Pausanias auf seinen Wanderungen durch Griechenland, so finden wir, dass er für den Bau des Landes kein Auge hat; er übersteigt die Hochgebirge, ohne sich um ihren Zusammenhang und um ihre Höhe zu kümmern; er nennt nicht einmal die Namen, während er bei der kleinsten Quelle

verweilt und von ihrer Beschaffenheit und ihrer Verehrung Auskunft giebt." Perhaps the inference then is that water was not available as it is now close under the Acropolis near the modern ascent, but that it was conducted by conduit to Glauce. The passage in Strabo (VIII, p. 379) does not militate against the inference. Though he says there was at the foot of the Acropolis a κρήνη, he also tells us that enough flowed to the city to afford a sufficient supply. The words ὥσθ' ἱκανῶς ἀπ' αὐτῆς ὑδρεύεσθαι point to a system of some size. The κρήνη Glauce not far away needed only a cross wall in one chamber to be ready to receive the sufficient supply somewhat vaguely defined by Strabo as ἐκρέουσα εἰς τὴν πόλιν. When Glauce fell into disuse, the old source furnished water at a point higher up, near the Turkish and modern spring. Such has been the usual fate of Greek conduits.

Some time later two openings were made through the Roman transverse wall in IV (Fig. 5), both seemingly testifying to a search for water. The one at the left suggests a quest in the line of the Greek gutter. It was poorly cut from in front. The west opening with its false arch was made probably to give access to the well immediately behind. This too was roughly cut at floor level from in front, and the threshold is a thin piece of the lowest course of the wall which escaped removal, because it lay in the cutting in the floor. The back part of the wall was torn out to facilitate the sinking of the well, which belongs to the period when Glauce was used as a house. But that this degradation of the fountain to alien purposes occurred only after many centuries of service is another tribute to the excellent character of Greek construction.

II. The Kinship of Fountains in the Period of the Tyrants

The development of the Greek water conduit and the contribution which one system makes toward the interpretation of another are themes best considered together. It is to be regretted that the excavation of the Pirene of Periander and of the fountain at Megara has not been completed and that the Enneacrunus is merely a name. But even so the meagre materials repay comparative study.

The obvious distinction has been formulated that, while Greek water conduits were regularly placed underground, oftentimes at a remarkable depth, the Romans carried their supply frequently long distances above ground by means of arched aqueducts. To explain the practice of the Greeks it has been suggested (*cf.* Gräber, *Ath. Mitt.* 1905, p. 21) that underground conduits were less easily destroyed in time of war, though the supply might be cut off as the Athenians cut off that of the Syracusans (Thucyd. VI. 100), and that the water in them was kept cooler. It seems a question whether this suggestion gives original motives or simply states inherent advantages subsequently recognized. Still more doubtful is the poetic explanation (*cf.* Daremberg and Saglio, I. 338, *s.v. aquaeductus*) according to which the Greeks, observing mountain streams disappear and later reappear fresh and cool, imitated natural subterranean courses when they constructed conduits, nor can it safely be believed that the Greeks followed the example of the Phoenicians in choosing one of two simple alternatives for the delivery of water. The problem may well have been worked out on Greek soil. A more primitive means of getting water could hardly be imagined than that shown by the pre-Pisistratean system at Athens. Here first a number of wells were dug with short arms reaching out to gather the water. Then wells lying close together were connected. This is the story of that curious network of wells and tunnels marked T^1–T^7 on the plan (Gräber, *l.c.* pl. I). The next step was to prolong a tunnel to an outlet below a natural terrace whither the water flowed of its own accord and could be stored in a rock-hewn basin. Traces of such a reservoir are still to be seen in the Pnyx rock. It was destroyed by Pisistratus to make room for the larger and more elaborate Enneacrunus. Such were the beginnings of the underground conduit at Athens.

In other places, like Corinth, it is equally obvious how the underground conduit came into being, and here by a different method. The early inhabitant saw water trickle forth from beneath ledges of conglomerate and sought in time to increase the supply by digging in the clayey soil at the point where the water issued. Later came the extension of such channels

under the conglomerate with branches that gathered the water from a wide area and brought it to a basin or a group of basins. This is essentially the story of Pirene.

Pisistratus had a precedent for his great underground conduit. It may be regarded as the extension, the elaboration, of the early Athenian system. Between the two came the Megarian, which, according to Gräber, was the model for the Athenian. The great system of Pisistratus, like that of Theagenes, shared the character of the pre-Pisistratean work in that it collected

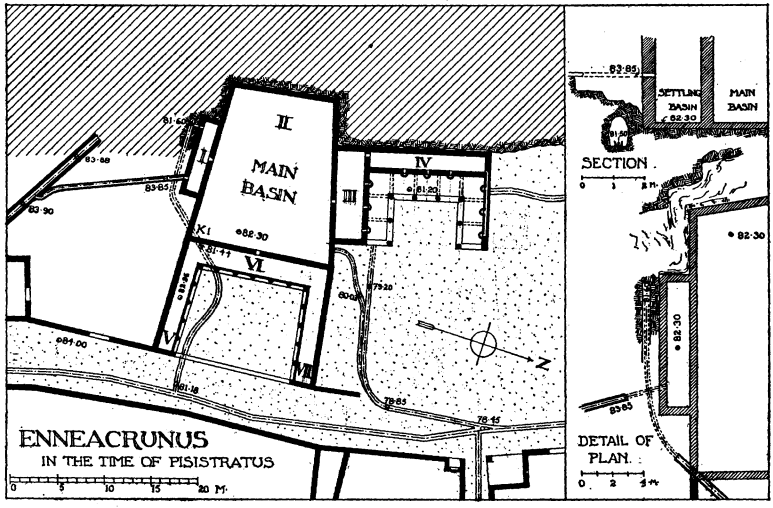

FIGURE 14. — ENNEACRUNUS.

subterranean water, both that which came from small springs and the surface percolations which find their way to a certain level in natural reservoirs and there accumulate.[1]

Whether the water poured immediately from the conduit into the larger chambers of the fountain is a question definitely answered in the case of the Enneacrunus. Like the ancient

[1] "Gerade wie die athenische nimmt auch die megarische Wasserleitung keine Rücksicht auf die Flussläufe in den Ebenen. Es ist das verständlich weil die Stollen kein Flusswasser aufnehmen, sondern nur das Grundwasser sammeln sollten, für dessen Höhe die Flussläufe fast ohne Bedeutung sind. Diese sind vielmehr fast das ganze Jahr hindurch ohne Wasser und bilden nur Abflussrinnen bei starken und längeren Regengüssen." (Gräber, *l.c.* p. 59.) These conduits therefore for long stretches of their upper courses had to be underground, and like the earlier system they continued underground to the outlet.

cisterns on the Aspis at Argos (*B.C.H.* XXXI, p. 152), the Enneacrunus had a settling basin (Fig. 14, I, the plan is reproduced from Gräber's study) which first received the water. That its purpose was to prevent the heavier particles of sediment from getting into the large reservoir II is established by the existence of the drain which extends its full length. This drain, to have emptied II, need have reached only to K 1, but the prolongation of it indicates that it must have served the special purpose of carrying off the contents of I without disturbing the water in II. The operation was as follows. All water poured into I cleared itself in passing the length of that reservoir to the inlet into II, and thence flowed to the spouts and the basin where it could be drawn. When it was necessary to clean the settling cistern, the water must have been diverted by means of some channel to II, and on occasion must even have passed by that reservoir to either the spouts or the draw-basin. Of such a channel a bit is perhaps preserved in a heavy block of which one face is stuccoed (Gräber, *l.c.* Fig. 32). When the water poured directly into II, it was possible to empty I, clean it completely and quickly with the help of the drain, plug the drain holes and turn the water again into it. The obvious advantage of this device was that the supply need never be interrupted, and that much of the sediment could be kept from the great reservoirs where its removal meant more work. When the pipe line in the conduit was cleaned (Gräber, *l.c.* p. 24) such a cistern must have been of especial service.

The earlier fountain of Theagenes at Megara seems to have been similarly equipped. The plan (Fig. 15 = *Ath. Mitt.* XXV, pl. 8, with modifications) shows that a channel ran along the west side, presumably from north to south, at the height of the sockle. It is conjectured that this was a drain from a settling basin rather than a means of carrying fresh water to a fountain of spouts which normally is arranged to provide for an overflow from the reservoirs and ought not to tap the supply before it reaches them. The Greek channel on the east face of Glauce (PLATE III, Fig. 3) would at first sight seem to have served a similar purpose and to have led to the tunnel beneath the platform and thence to the fountain drain. The levels, however,

show that the water ran the other way, and that the tunnel was merely cut through the channel which carried water from the front, probably excess, to some cistern behind the fountain.

The Corinthian fountain helps in the interpretation of the Megarian. The ground plan of the latter (*Ath. Mitt.* XXV, pl. 8) shows two reservoirs, a large one at the back and a narrow one in front, from which the water was taken. From

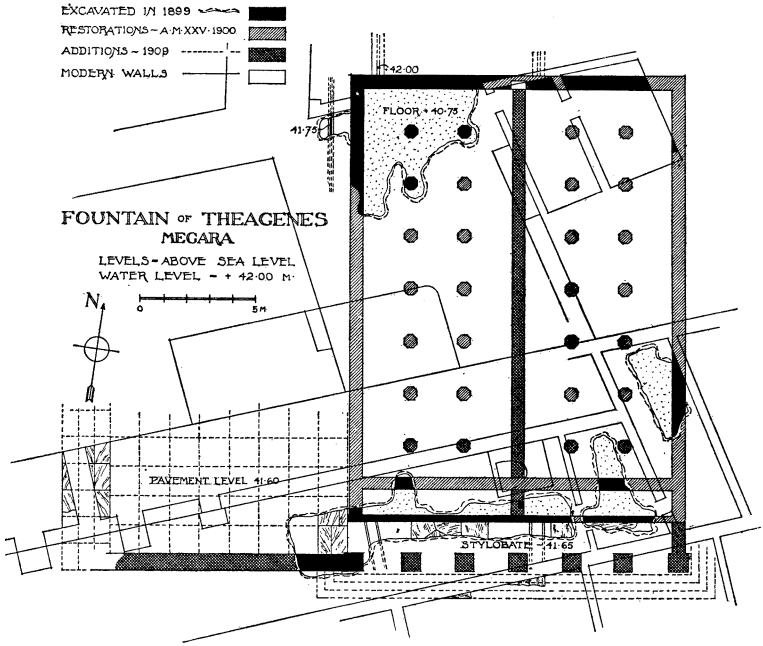

FIGURE 15. — FOUNTAIN OF THEAGENES.

the latter, two drains, one at the east end, the other just beyond the middle, seem to have converged to a common point. The extravagance of two drains from the same reservoir raises the suspicion that it was really not a single basin. The trench unfortunately has been filled in, but the plan shows a piece of a block just to the left of the second drain, and this may have belonged to a short wall which lay exactly in the major axis of the building (Fig. 15), and would consequently have divided the narrow reservoir into two equal parts. Each of these would then have a drain. On this probability hinges yet another,

namely that the octagonal shafts in the major axis should be placed on a low solid wall of the same height as the partition wall between the front and back reservoirs. This conjectured division, which excavation could readily test, would have made it possible to fill and empty the fountain one half at a time — a great advantage. If the plan in the publication is correct, the cleaning of the reservoirs meant that for a period of time no water was available. If the conjecture is accepted, then the further assumption must be made that there was a channel to carry water to the right half when the left was empty. The arrangement of two independent systems under one roof is illustrated by the Corinthian fountain.

Glauce was indebted to the Megarian system for an important detail which it modified. The solid wall between the front and back reservoirs is confined to two of the four large chambers (II and III) in Glauce, but the upper course, which extends across the other two chambers, completed an interior stylobate for shafts and pilasters (Fig. 11). The excavators at Megara found fragments of half columns which occupied a corresponding position. The origin of this wall, which became a feature in fountain construction, continues obscure, unless it can be proved that the narrow front reservoir might be full, while a part of the large reservoir behind was empty.

There is evidence that the Megarian, like the Corinthian fountain, had a portico. On the plan of the former, 1.75 m. in front of and in line with the west wall, one sees a block, 0.05 m. below the level of the platform. This may mark (*Ath. Mitt. l.c.* p. 32) the position of a pilaster in a row of columns along the outer edge which brought the front of the building into line with an adjoining one. Two blocks of the steps are to be seen embedded in the basement walls of the houses, where they serve the modest purpose of shelves.

The restoration of the roof starts with the fact that a remarkable number of columns (*κρήνην . . . ἐς τὸ πλῆθος τῶν κιόνων θέας ἀξίαν*)[1] supported it. This implies a ceiling of stone slabs like that of the city fountain of Pergamon (*Ath. Mitt.* XXVII, p. 38). The height of the ceiling is known (5.50 m.), which is approximately the height in Glauce, where the measurements

[1] Paus. I, 40. 1.

vary from 5.45 m. (IV) to 5.58 m. (I) at the front, to 5.35 m. (IV) at the back. In the centre of the back wall of the Megarian fountain, 4.62 m. above the floor, is a rectangular hole 0.85 m. wide, 0.45 m. high, and 0.35 m. deep, and at the back of this is a block of poros; the rest of the wall is composed of hard blue limestone. The position of this hole at the end of the central row of columns indicates that it received a beam surmounting the columns. Upon this beam would have rested the cross beams, 2.33 m. long and 0.43 m. thick, which reached across to the octagonal columns and supported the stone ceiling. Only by such a restoration as this does it seem possible to explain the course, 0.43 m. high, which lies above the beam hole. The columns in the major axis were shorter and perhaps thicker than the others (0.50 m.), judging from the width of the beam hole (0.85 m.). Whether there was a gable above the ceiling is uncertain.

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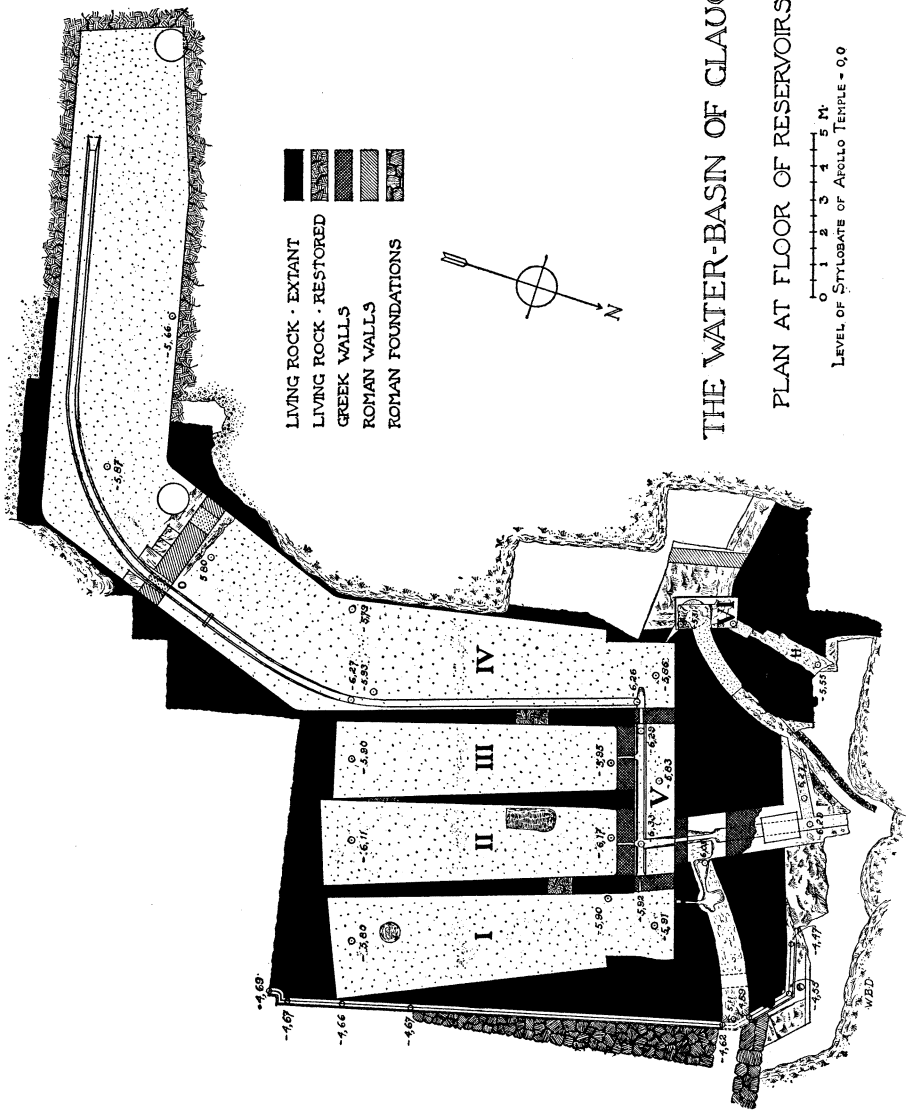

THE FOUNTAIN OF GLAUCE—GROUND PLAN